



Original communication

An analysis and report of custodial deaths in Nebraska, USA: Part II

Cordelia N. Okoye M.P.H., Ph.D., Assistant Professor^{a,*}, Matthias I. Okoye M.D., J.D., Physician and Lawyer^a, David T. Lynch B.S., Biomedical Scientist^b

^a Nebraska Institute of Forensic Sciences, Inc., 6940 Van Dorn Street, Suite 105, Lincoln, NE 68516, USA

^b Creighton University School of Medicine, Omaha, NE 68178, USA

ARTICLE INFO

Article history:

Received 2 March 2011

Received in revised form

22 January 2012

Accepted 20 April 2012

Available online 23 July 2012

Keywords:

Death in police custody

Forensic medicine

Forensic science

Forensic pathology

ABSTRACT

All medico-legal cases investigated by the Nebraska Institute of Forensic Sciences, Inc. in Lincoln, Nebraska, USA, between 2003 and 2009, were reviewed for deaths which occurred in custody ($n = 38$). The causes of death, in ranked order, were natural causes 37% (14/38), followed by homicide 21% (8/38), accident 21% (8/38), and suicide 21% (8/38). Each cause of death was then subdivided by age, race, and sex. The findings of this investigation are a continuation of a previous study of the same population from 1991 to 1996 ($n = 51$). This article also provided five case studies: two natural deaths, two suicides, and one homicide.

© 2012 Elsevier Ltd and Faculty of Forensic and Legal Medicine. All rights reserved.

1. Introduction

This study presents the prevalence of causes and manners of deaths in custody in Nebraska, USA, and compares this with other data collected across the USA. Death in custody is an uncommon occurrence, most often owing to natural causes in the United States. Continuing the work of a previous study on custodial deaths in Nebraska, this study aims to explore this unique set of deaths.¹ By continuing to report deaths in custody, trends can be revealed and explored in rural America. The expanding body of literature is continually revealing trends of decreased mortality both nationally and locally.^{2–4} This will also aid in establishing appropriate preventative measure to avoid future deaths.

Custody deaths continue to display unusual causes of death, including the use of unlikely objects in suicides and homicides. Over the past few decades, both suicide and homicide rates have dropped dramatically.³ Continued attention to the circumstances surrounding these cases could continue this trend. Therefore, this paper also aims to discuss the circumstances and pathology of various cases which law enforcement and forensic professionals may encounter. Five interesting case studies are presented to provide examples of potential scenarios professionals may encounter. The cases include a natural death from cardiac arrhythmia induced by a conduction anomaly, a suicide from an

acute drug overdose of propoxyphene, a suicidal hanging in a jail cell with a bed sheet, a natural death from gastrointestinal hemorrhage, and a homicidal death due to asphyxia in the setting of restraints.

2. Methods and materials

Medico-legal cases from the Nebraska Institute of Forensic Sciences, Inc. in Lincoln, Nebraska between 2003 and 2009 were researched for deaths which occurred in police custody, including those during the arresting process. A total of 38 were identified out of a pool of 1255 autopsies. This study took into account cause and manner of death listed on the death certificates, age, sex, and race. The location of custody varied and included the Nebraska State Penitentiary, Lincoln, Regional Center, and county police department holding cells. Also included in this study are 5 s autopsies requested from other states, which were brought to Nebraska. The original autopsies were performed in the states of California, New York, Mississippi, Texas, and Illinois.

3. Results

The total number of deaths during this study was 38, which was one out of every 33 autopsies encountered. This yields an average of 5.4 deaths in custody per year. The most common cause of death was natural causes (37%), followed by homicide (21%), accident (21%), and suicide (21%). Caucasians composed 76% of total deaths, African-Americans were 18%, and Hispanics were 5%. Men made up

* Corresponding author. Tel./fax: +1 402 486 3447.

E-mail address: cordelia.okoye@gmail.com (C.N. Okoye).

Table 1
Manner of Death, Race, Age, and Sex.

Manner	Number
Natural	14
Homicide	8
Suicide	8
Accident	8
Race	
White	29
Black	7
Hispanic	2
Age	
11–20	1
21–30	8
31–40	10
41–50	9
51–60	3
61–70	4
71–80	3
Sex	
Male	30
Female	8

79% of all deaths compared to 21% of women (Table 1). The average age across all groups was 43.2 years old. Seventy-three percent of the decedents were 50 years old or younger.

Of the 15 natural deaths, 36% were the result of cardiovascular disease, 14% were due to acute infection (pneumonia and sepsis), and 14% were the result of cancer (gastric and pulmonary). A variety of other natural causes were seen, including gastrointestinal hemorrhage, cardiac arrhythmias, hepatitis, and asthma. The average age of natural death occurred at 52, which is the oldest of all the categories of death.

The eight homicidal deaths which accounted for 21% of total deaths were all the result of gunshot wounds or asphyxia. All of the individuals were men. Most likely to die as a result of homicide were African-American men, who made up sixty-three percent of the group. Included in this group were five cases brought to Nebraska from out of state for second autopsies. These five included all three asphyxial deaths. The remaining three cases were arrest related gunshot wounds.

A total of 21% of deaths in custody were from suicide. Of these, 75% were in ages below 40. The average age of suicide was 35, making this the youngest group of the study. The causes of death included 63% hanging (5/8), 25% drug overdose (2/8), and 13% (1/8) gunshot. Men dominated this group versus females by a ratio of 7 to 1.

Accidents also accounted for 21% of deaths in custody. Five out of the six deaths were male. Accidental deaths were most commonly from asphyxiation (38% 3/8), followed by falls (25% 2/8), overdose (25% 2/8), and blunt-force trauma (13% 1/8). The average age of this group was near the average age of the total study at 41. Data on all manners of death is found in Table 2.

4. Case studies

4.1. Case I – cardiac conduction anomaly

A 38 year-old white male was found unresponsive in his jail cell. CPR was started and he was transported to the local emergency department but was pronounced dead at the scene. His medical history includes brain damage from a helicopter crash in the 1990s. He was diagnosed from D&E a year before with Parkinson's syndrome.

The decedent had only minor evidence of trauma, consisting of two abrasions on his left leg. There was hemorrhagic pulmonary edema and congestion involving all areas of the lungs, and a 1.5 cm calcified granuloma of the right hilar lymph nodes. The heart was

Table 2
Cause of death and age, race, and sex (2003–2009).

Natural		Accidents	
Age		Age	
11–20	0	11–20	1
21–30	1	21–30	0
31–40	1	31–40	5
41–50	6	41–50	1
51–60	2	51–60	0
61–70	2	61–70	1
71–80	2	71–80	0
Race		Race	
White	12	White	7
Black	2	Black	0
Hispanic	0	Hispanic	1
Sex		Sex	
Male	9	Male	6
Female	5	Female	2
Method		Method	
Cardiovascular disease	5	Asphyxia	3
Cancer	2	Fall	2
Pneumonia	1	Drug overdose	2
Asthmatic attack	1	Blunt trauma	1
Liver disease	1		
Cardiac arrhythmia	1	Homicide	
Pulmonary thrombosis	1	Age	
Gastrointestinal hemorrhage	1	11–20	0
Sepsis	1	21–30	3
		31–40	2
		41–50	1
		51–60	1
		61–70	1
		71–80	0
Suicide		Race	
Age		Black	5
11–20	1	White	2
21–30	2	Hispanic	1
31–40	3	Sex	
41–50	1	Male	8
51–60	0	Female	0
61–70	1	Method	
71–80	0	Gunshot	5
Race		Asphyxia	3
Black	0		
White	8		
Hispanic	0		
Sex			
Male	7		
Female	1		
Method			
Hanging	5		
Drug overdose	2		
Gunshot	1		

430 g and had a moderate amount of epicardial fat, especially over the right ventricle and along the coronary vessels. Grossly there was fatty infiltration in to the subepicardial tissue. The heart was sent to a cardiovascular pathologist for a more detailed examination. No acute central nervous system trauma was identified. Toxicology studies were negative.

Death was determined to be natural. The manner of death was due to fatty infiltration of the cardiac conduction system which induced a fatal arrhythmia.

4.2. Case II – propoxyphene overdose

A 37 year old Hispanic male and long-term inmate was noticed by his cellmate to be acting differently. Upon further investigation by an officer, the individual was found to be marginally responsive. He then had a possible seizure according to witnesses, after which he was noticed to be cyanotic and pulseless. Monitoring equipment found him to be in asystole. However, after 25 min of CPR, his pulse returned. During this time he remained unresponsive, and he required constant pharmacologic blood pressure support and mechanical ventilation. Brain death was confirmed by technetium

scan. Hours later he was removed from life support and pronounced dead.

Upon autopsy, he was noticed to have 80% occlusion of the left main coronary artery from atherosclerosis. The decedent also had severe fatty liver disease and early micronodular cirrhosis. Toxicology revealed high levels of propoxyphene (Darvon®), which is a mild opiate, similar to methadone. Propoxyphene is well-known to cause overdose due to its narrow margin of safety. Cause of death was acute drug overdose, and the manner of death was suicide.

4.3. Case III – suicidal hanging

A 28 year old white female inmate was found in her jail cell hanging from the upper bars of the cell by a bed sheet around her neck (Fig. 1). At this time she had a pulse and shallow respirations. No other signs of injury or trauma were noticed at that time according to law enforcement personnel. The individual passed away despite CPR and intubation. Prior to the incident she filled a request form stating she was “hearing voices, that she was thinking of suicide, that she needed counseling”.

A complete autopsy was requested which found a ligature abrasion and contusion on the right side of her neck. No petechial hemorrhages were noticed in either eye. The skin of the neck demonstrates livor mortis above the placement of the sheet (Fig. 2). The skeletal muscles of the neck did not have any hemorrhages. The laryngeal cartilage and hyoid bone were both intact. The cause of death was asphyxia by hanging, and the manner of death was suicide.

4.4. Case IV – perforated GI ulcer

A 47 year old white male was found unresponsive in his jail cell after vomiting blood. When emergency services arrived, he had pulseless electrical activity and CPR was performed. He was transported to a hospital where bilateral chest tubes were placed for pneumothoraces. He regained a pulse and a CT scan was performed which showed free intraperitoneal air with pneumatosis intestinalis, as well as free air in the portal vein. Further testing showed metabolic acidosis and hypoglycemia. Toxicology was positive for amphetamines, PHC, and opiates. The next day the patient was preparing for dialysis due to renal failure when he developed asystole. Resuscitation efforts were not successful. After an initial autopsy, a second autopsy was requested.

The second autopsy revealed a hemorrhagic and perforated ulcer (3.5 × 2.0 cm) of the pyloric region of the stomach and proximal duodenum. The diaphragm showed fibrinopurulent exudates, as well as regenerative changes. Sections of the tongue



Fig. 2. Case III – neck of hanging victim demonstrating ligature abrasion and contusion.

showed intramuscular hemorrhage. There was extensive hemorrhagic necrosis of the omentum, small bowel, and colon. There were bilateral petechial hemorrhages in the eyes.

The manner of death was determined to be natural. The cause of death was acute gastrointestinal hemorrhage due to perforated ulcer. The toxicology analysis of the vitreous fluid and liver tissue were both negative. Methamphetamine identified in the ante-mortem blood sample of the deceased is not believed to have contributed to his death.

4.5. Case study V – asphyxial death due to restraint with a spit mask and helmet following placement of handcuffs

A 23 year old African American male was brought into custody following a standoff. He was placed in a county jail and put on suicide watch because of alleged statements he made and because he stopped eating. He was then found to have taken threads from the bed which law enforcement thought he would use to tie around his neck. At this point personnel decided to apply handcuffs, but this resulted in a struggle wherein the deceased was brought to the ground for approximately 15 min. He was kept restrained in a bed with a helmet on and a spit mask, a fabric mask designed to prevent an individual from spitting on others. There were restraints across his chest, legs and trunk at this time. The nurse on duty left to retrieve a blood pressure cuff, but found the individual unresponsive when she returned. Around the time he coded, his fingerstick glucose was 25 mg/dl and his potassium was 6.1 mg/dl, with a phosphorous increased at 8 mEq/dl. Resuscitation efforts were unsuccessful and he was pronounced dead. Toxicology showed ketones of 50 mg/dl of acetone and marijuana metabolites Delta 9 THC less than 9 ng/dl, as well as a metabolite of an antihistamine product.

Primary and secondary autopsies were performed revealing extensive purple contusion (8 × 6 cm) and skin slippage of the anterior neck (Fig. 3). Tiny petechial hemorrhages of both eyes were noticed, more so on the right sclera (Fig. 4). Very faint petechial hemorrhages were found in the periorbital region. Left sternocleidomastoid hemorrhages were found. Contusions of the right cheek (5 × 2.5 cm) and left cheek (3 × 2 cm) were noted. Hyperemia of the mucosal lining of the bronchi and bronchioles were found in both lungs. The lungs also showed bilateral acute hemorrhagic pulmonary edema. The manner of death was determined to be homicide,

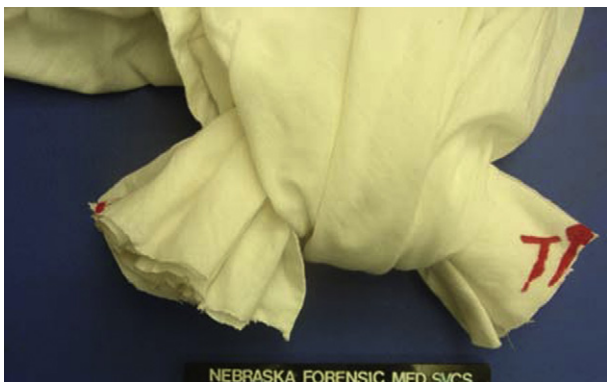


Fig. 1. Case III – bed sheet used for ligature.



Fig. 3. Case V – anterior neck of decedent showing abrasion and skin slippage.

and the cause of death was determined to be asphyxia due to restraint with a spit mask and helmet in place following the application of handcuffs.

5. Discussion

The result of 5.4 deaths per year is in contrast to part I of this study from 1991 to 1996 which reported an average of 10.2 deaths per year.¹ Despite fewer deaths per year, similar patterns were seen across the manners of death and demographics of the deceased. This includes the predominance of natural causes as well as hanging as the preferred method of suicide. Both parts of this study report different patterns of death in custody compared to studies performed in other regions of the United States. Grant et al found in Maryland that in the 1990s and 2000s that 63% of deaths were undetermined, 10% of deaths were natural, 8% due to homicide, 6% due to accident, and 6% due to suicide.² This is likely the result of regional differences. These differences highlight the unique data set found in Nebraska. This high level of variability implies that the best tool for comparison is from national data from the Department of Justice (DOJ).

The DOJ compiled statistics from 2001 to 2002 on all deaths in police custody nationwide.³ Natural causes were the leading cause of death in this study. State penitentiaries saw 89.3% (5535/5824) of their inmates die from illness, including AIDS, versus 51.8% (1000/1931) in local jails. Combining these groups give a value of 84.3% (6535/7755) overall death due to natural causes. Our value of 37%

(14/38) is notably smaller than this, which partially reflects our inclusion of arrest-related deaths. Excluding these cases, our value is still much lower at 43.8% (14/32) ($p < 0.001$). Smaller jails were noticed to have higher rates of suicides, which likely accounts for most of this difference. Other confounding factors include our smaller population, regional differences, and perhaps recent trends.

Among the DOJ findings were that the suicide rate was much smaller in state penitentiaries versus local jails (5.8% and 32.3%), a finding seen in other parts of the world as well.⁵ Combining local jails and penitentiaries, 12.5% of deaths overall were due to suicide. Our study demonstrates 21% of deaths in Nebraska police custody were the result of suicide. This reflects the fact that our population came from both local and state facilities. Deaths in custody due to suicide have been dropping since the 1980s as reported in national and state studies.^{2,3} A similar change was noticed in this study as well since the percentage of deaths due to suicide in part one of this study was higher at 33% (17/51).

Case Study I described the sudden death of a 38 year old due to fatty infiltration of the cardiac conducting system. Arrhythmogenic right ventricular cardiomyopathy has a prevalence between 1/1000 and 1/5000.⁶ As such, it is a plausible cause of death for cases of sudden, unexplained death. These patients often have symptoms prior to death including syncope and palpitations.⁷ As with all cases of sudden death, the heart deserves close attention. The gross examination is of great importance, since it has been shown that macroscopic subepicardial adipose tissue has been shown to correlate well with microscopic fatty infiltration.⁸ Anatomic anomalies resulting in arrhythmia can be diagnosed postmortem with close attention to the decedent's history and gross examination of the heart. Final diagnosis can be made upon microscopic examination.

Case Study III illustrates many important points about suicides in custody. Roughly 70–80% of individuals talk about suicide before attempting it.⁹ Even seemingly non-lethal objects, such as a bed sheet, can be used to commit suicide. Hanging can occur without full suspension of the body, and can occur in any position. This hanging was done in a county jail, which is a far more likely setting than in a state penitentiary.³ Forty-seven percent of suicides in local jails are most likely to occur within the first 30 days of time served.¹⁰ These factors must be recognized to bring about a further reduction in the suicide rate.

Case Study V demonstrates the dangers associated with the use of restraints in agitated individuals. Cases of positional and postural asphyxia and excited delirium in the setting of restraints are established in the literature.^{4,11,12} Sudden and unexplained death has been shown to occur in the setting of altered behavior, restraints, and stimulants.¹³ This case resulted from restraints in the setting of a 'spit mask,' made of fabric. This impingement on airflow, in addition to the physical restraints was enough to asphyxiate the individual. The toxicological studies were not significant factors in his death.

The decrease in the suicide rate in Nebraska may also be explained by the fact that the local and state law enforcement agencies instituted suicide prevention procedures in all correctional institutions after the first part of the study. Additionally, training programs were provided from 2003 to 2010 during annual forensic science symposia by Nebraska Institute of Forensic Sciences, Inc. (NIFS).

With regard to case study V where death was associated with restraint in the setting of a "spit mask" made of fabric, the use of such restraints and spit masks have been discontinued by the law enforcement agencies. Several training workshops about physical restraints have been performed for the law enforcement agencies both at local and state level in Nebraska since 2003 by Nebraska Institute of Forensic Sciences, Inc.



Fig. 4. Case V – petechial hemorrhage on sclera Images.

Custody deaths are a rare, but often preventable event. By continuing on Part I of this study, trends are being revealed in the custody deaths in Nebraska, USA. These trends include a reduced number of deaths per year as well as a reduction in the number of suicides. This mirrors progress being made nationally in reducing rates of mortality. The case studies presented demonstrate the wide variety of cases that are encountered by forensic professionals. Despite this variety, some clear patterns have emerged. Natural deaths, led by cardiovascular disease, remain the most common cause of death in custody. Hanging remains the most likely cause of suicidal death. By continuing to report local data on custody deaths, it is hoped that additional measures can be taken to further reduce mortality in custody.

Conflict of interest

The authors hereby state that they do not have any financial or other conflict of interest regarding the publication of this journal article.

Funding

None.

Ethical approval

None.

Acknowledgements

We would like to thank Ike Okoye, Cory Avery, Sally Knickman, and Marguerite Longsine for their assistance and invaluable contributions

to Nebraska Institute of Forensic Sciences, Inc., including the long hours investigating these and countless other cases.

References

1. Okoye M, Kimmerle EH, Reinhard K. An analysis and report of custodial deaths in Nebraska, USA. *Journal of Clinical Forensic Medicine* 1999;**6**:77–84.
2. Grant JR, Southall PE, Fowler DR, Mealey J, Thomas EJ, Kinlock T. Death in custody: a historical analysis. *Journal of the Forensic Science* September 2007;**52**(5):1177–81.
3. Mumola Christopher J. Bureau of Justice Statistics Special Report. Suicide and homicide in state prisons and local jails, <http://bjs.ojp.usdoj.gov>; 2005 [retrieved 15.02.11].
4. Reay DT, Corinne LF, Stilwell AD, Arnold J. Positional asphyxia during law enforcement transport. *The American Journal of Forensic Medicine and Pathology* 1992;**13**(2):90–7.
5. Blaauw E, Kerkhof A, Vermunt R. Suicides and other deaths in police custody. *Suicide & Life – Threatening Behavior* 1997;**27**(2):153.
6. Hamilton RM. Arrhythmogenic right ventricular cardiomyopathy. *Pacing and Clinical Electrophysiology* 2009 Jul;**32**(Suppl. 2):S44–51.
7. Dewilde W, Boersma L, Delanote J, Pollet P, Scholzel B, Wever E, et al. Symptomatic arrhythmogenic right ventricular dysplasia/cardiomyopathy. A two-centre retrospective study of 15 symptomatic ARVD/C cases and focus on the diagnostic value of MRI in symptomatic ARVD/C patients. *Acta Cardiology* 2008;**63**(2):181–9.
8. Pathology of myocardial fatty infiltration: an autopsy report from 117 cases. *Zhonghua Xin Xue Guan Bing Za Zhi* 2010 Apr;**38**(4):350–3 [Chinese].
9. McCleave NR, Latham D. Self-injurious behaviour in police custody. *Journal of Clinical Forensic Medicine* 1998;**5**:13–6.
10. Noonan Margaret. Mortality in local jails, 2000–2007. Bureau of justice statistics special report, <http://bjs.ojp.usdoj.gov>; 2008 [retrieved 15.02.11].
11. Benomram FA, Hassan AL. An unusual accidental death from positional asphyxia. *American Journal of Forensic Medicine Pathology* 2011 Mar;**32**(1):31–4.
12. Grant JR, Southall PE, Mealey J, Scott SR, Fowler DR. *Excited Delirium Deaths in Custody: Past and Present* 2009;**30**:1–5.
13. Southall P, Grant J, Fowler D, Shauna S. Police custody deaths in Maryland, USA: an examination of 45 cases. *Journal of Forensic and Legal Medicine* 2008;**15**:227–30.